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BRIEF REPORT

Conservative management of a brain abscess in a patient with *Staphylococcus lugdunensis* endocarditis

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Brain abscess is defined as a focal, intracerebral infection that begins as a localized area of cerebritis and develops into a collection of pus surrounded by a well-vascularized capsule. Microorganisms can gain access to the brain through several mechanisms, most commonly by direct extension of an adjacent suppurative focus (i.e. otitis media, mastoiditis, or sinusitis) or by direct penetration via an open cerebrospinal fluid leak (e.g. after cranial fracture or neurosurgical complication). Another mechanism of brain abscess formation is hematogenous bacterial spread from a distant focus of infection, such as endocarditis.

Despite the presence of continuous bacteremia, brain abscess is an uncommon complication after bacterial endocarditis [1] (less than 5% of cases in most series). However, endocarditis due to *Staphylococcus lugdunensis* follows a more fulminant course, typically resulting in either cardiac complications or systemic emboli with metastatic foci of infection. Optimal handling of patients with bacterial infections of the central nervous system often requires surgical management; nonetheless, a subset of patients may be treated with appropriate antimicrobial therapy alone [2–4]. In this setting, the choice of antibiotic agents should be based on the results of susceptibility testing and the drug's cerebrospinal fluid penetration. Here, we report a case of brain abscess in a patient with *S. lugdunensis* endocarditis involving a native bicuspid aortic valve. We also review the literature regarding the conservative management of brain abscesses in this clinical setting.

A 49-year-old woman with an unremarkable medical history was admitted to our hospital with fever of 39°C, right-sided hemiparesis and aphasia. Computed tomography (CT) scan of the brain suggested an ischemic lesion of the left external capsule. *S. lugdunensis* was isolated from all four of the blood cultures taken upon admission. The organism was shown to be susceptible to all antibiotics tested. A transesophageal echocardiograph (TEE) confirmed the presence of large vegetations (12×4 mm) on the bicuspid aortic valve and subsequent regurgitation due to aortic valve destruction. The diagnosis of endocarditis due to *S. lugdunensis* involving a bicuspid aortic valve with severe aortic valve insufficiency and embolic septic cerebrovascular insult was established.

Antibiotic therapy with flucloxacillin (2 g iv q4h), supplemented with gentamicin (80 mg iv tid) for the first 5 days, was started. Body temperature, neurological deficiencies and inflammatory laboratory values normalized rapidly and the patient remained hemodynamically stable. After 6 weeks of antibiotic therapy, TEE showed persistent aortic valve vegetation and an increased diastolic diameter of the left ventricle (EDVI: 63 ml/m^2). Valve replacement was subsequently recommended. A second CT scan (Fig. 1) performed during the pre-operative investigation revealed the presence of a small abscess (1 cm in diameter) at the level of the left insula. Given the size of the abscess, the lack of neurological symptoms and the known tendency toward development of metastatic lesion secondary to *S. lugdunensis* bacteremia, surgical abscess excision was deferred. Because of its optimal ability to penetrate the blood brain barrier, rifampin (600 mg orally bid) was added to the antibiotic regimen.

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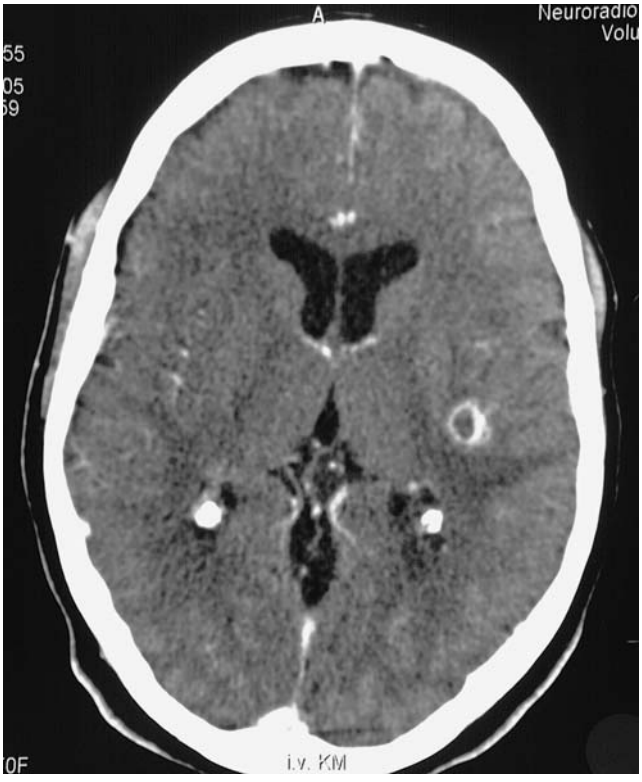

Fig. 1 Pre-operative computed tomography scan of the brain

After another 2 weeks of medical therapy, CT scan revealed a reduction in the size of the abscess (0.5 cm). At this time a mechanical valve was implanted without complication. Histological examination yielded neither bacteria nor signs of florid infection. After a total of 10 weeks of intravenous antibiotic therapy, the treatment was stopped. There were no signs of relapse during the following 6 months.

Coagulase-negative staphylococci (CoNS) are saprophytes that reside on human skin. In the past, these bacteria were considered to have little or no pathogenic potential. Recently, however, CoNS have been recognized as clinically significant pathogens in bloodstream infections, especially in patients with indwelling prosthetic devices, foreign bodies and intravascular catheters. Correspondingly, a multicenter study recently showed that the incidence of CoNS as a putative agent of native valve endocarditis is increasing, in particular due to the widespread use of long-term intravenous catheters [5]. Patients with underlying congenital or acquired cardiac abnormalities are at particular risk.

S. lugdunensis was first described in 1988 [6] as a distinct species within the group of CoNS. *S. lugdunensis* appears to be particularly aggressive [7] and therefore must always be considered as a significant pathogen when isolated from cultures [8]. Major sources of *S. lugdunensis* infections in the community are dental abscesses, cutaneous infections, infected vascular devices and cardiac pacemakers [9]. In contrast to other CoNS, this organism frequently causes native valve endocarditis, mainly involving the left heart, and is often complicated by rapidly progressive valve destruction (21%) and paravalvular abscess formation (23%), generally requiring early valve replacement [7] in addition to specific antibiotic therapy [10]. Systemic emboli with metastatic suppurative foci were seen in 32% of the reported cases [10].

Antibiotic therapy alone in patients with bacterial brain abscess unrelated to endocarditis was long considered suboptimal since it prohibits the establishment of an accurate diagnosis based on microbial specification. Thus, surgery with abscess debridement was usually performed. Different studies, however, corroborated the hypothesis that in select patients, high-dose intravenous antibiotic therapy is effective [3, 4, 11]. This strategy has been shown to be successful in high-risk patients, in patients with multiple abscesses, abscesses at deep or dominant locations, and in patients affected by concomitant meningitis or ependymitis. Nevertheless, for abscesses larger than 2.5 cm in diameter, surgical therapy is still recommended [3].

The optimal duration of antimicrobial therapy for brain abscesses, alone or related to endocarditis, is not yet known, but most investigators agree on a long-term treatment, with the average duration ranging between 4 and 12 weeks [11]. Patients treated with antimicrobial therapy alone should also receive careful clinical and radiological follow-up. In stable patients, continuation of antibiotic therapy in an outpatient setting may be justifiable and cost-effective. Some authors propose prolonging antibiotic treatment for up to 6 weeks after successful abscess resolution is shown by CT scan [12], but premature cessation may be considered if the neurological status of the patient is stable, the ESR is within normal limits and radiographic studies reveal no lesions or a minimal stable lesion without inflammation [11].

The present case of cerebral abscess as an embolic complication of infective endocarditis was successfully managed using conservative methods, and the efficacy of this approach is supported by the results of our literature review. The described treatment validates the thesis that in select clinical settings, it is possible to cure such a serious disorder without surgical intervention.

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